

Practice Problem on Cutting Planes

Consider the following integer program:

$$\begin{array}{ll} \text{Maximize} & Z = 2x_1 + x_2 + 3x_3 + 4x_4 \\ \text{s.t.} & 2x_1 + 2x_2 + 3x_3 \leq 8 \quad (1) \\ & 2x_1 + 3x_2 + 4x_3 + 4x_4 \leq 10 \quad (2) \\ & 5x_1 + 4x_2 + 5x_3 \geq 6 \quad (3) \\ & x_1, x_2, x_3, x_4 \geq 0 \text{ integer} \end{array}$$

Parts (a) - (c) below are independent of each other. You are given three fractional solutions which are feasible for the LP-relaxation of the problem. For each of the fractional points, give a cutting plane that will cut off the fractional solution.

a) $(0, 0, 2.5, 0)$

b) $(0, 2.5, 0.3, 0.3)$

c) $(1, 0.5, 0, 0)$